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should not be forgotten that the true purpose of systematic work must be to increase our knowledge of the relationship of animals of any special group already known, and serve in some way as a connecting link in the chain of the various branches of Zoology. We have our memoirs of systematic Zoology, of Psychology, of Palæontology, of Comparative Anatomy, of Histology, etc., treating of their respective sciences as isolated departments and strongly biassed by the characteristics of the sciences from which they originated. Comparative Anatomy, and Physiology as well as Histology, are the children of Human Anatomy, and this, in its turn, was gradually developed from the needs of medicine. Embryology and Palæontology, though so intimately connected, are rarely treated together, the latter being considered to belong, by birthright, to Geology. Psychology is but now becoming emancipated from speculative Philosophy. We have, however, no recent memoir on Zoology in the Aristotelian sense; the sciences forming the branches of Aristotelian Zoology stand upon separate pedestals. They have grown up independently of one another, yet they all converge towards a common point, each an important part in the life history of every animal, and the common link which is to unite them all is (when rightly understood) systematic Zoology.

Working in this spirit, systematic Zoology helps us in our attempts to understand the laws of nature; these must remain unintelligible to him who is busy with naming and classifying materials, reducing his science to an art, merely accumulating facts to be stored in museums, forming as it were a library of nature. To him its books will be inaccessible and its laws as inexplicable as are the laws of the motions of the planets to one who has no knowledge of the existence of gravitation.

WHAT I FOUND AT HAMPTON BEACH.

BY PROF. J. W. CHICKERING, JR.

ABOUT fifty miles northeast from Boston, on the coast of New Hampshire, juts out into the ocean the bold headland known as Boar's Head, perhaps half a mile long, a quarter of a mile wide,

and rising by a gentle slope to the height of perhaps a hundred feet, where its abrupt sides are washed by the waves ; a mass of drift with alternate layers of gravel and water-worn stones of various sizes, gradually wasting away under the encroachments of wind and tide ; the old fishermen telling of the time, when many rods farther out, they used to see

“ The Head of the Boar,
Toss the foam, from his tusks of stone.”

To the north, a long, sloping, sandy beach stretches away in a sweeping curve to Little Boar’s Head, three miles distant, and to the south a similar beach curves around for two miles to the banks of Hampton River, and those Rivermouth Rocks, whereof Whittier sings. On beyond, lies Salisbury Beach, and farther on, low down in the horizon, appears the blue outline of Cape Ann.

At the northern end, the beach is covered with huge boulders as far as a granite ledge lying midway between high and low water mark, hollowed into caves and recesses and surrounded with little pools full of life and beauty. From this point a hard, smooth and level beach stretches away for a mile, till, approaching the rocks and the river, it is by cross currents rippled and furrowed, affording a fine opportunity to study the effects of tidal and wave action. Back of this, rise a number of sand hills, fifteen or twenty feet high, raised into fantastic shapes by the wind, from which, when the west wind blows, the fine white sand drifts across the beach like snow in winter. Back of these hills, are marshes, interlaced by a network of small streams and ditches, attractive both to the sportsman and the naturalist.

Suppose on a pleasant morning in July we rise with the sun and start on a voyage of discovery. The smooth, shining beach is half covered with the advancing or retreating tide, and with our eyes wide open, we walk down the sand. Our attention is soon attracted by a number of curious tracks, sometimes circling around the small pools found in the hollows surrounding every large rock ; sometimes leading for many rods in a straight line towards the water. Let us follow one to its termination.

If in the sand, digging a few inches turns out a little crab (*Cancer Sayi*?) who if set at liberty, either writes his curious hieroglyphics as he retreats along the sand, or more probably commences at once to bury himself again with marvellous rapidity. The size of the animal will be found to vary the appearance of his

track. If it terminates in a pool, a close examination will detect a little depression in the bottom, with a slight but constant motion, and a stick will reveal his crabship quietly twiddling his thumbs, and greatly averse to being disturbed. They are largely used as bait for Blue-fish, not often hereabouts for food. They require careful handling as their claws have a savage nip.

A different track, finer and broader, leads to the deep burrow of a most unsightly worm, perhaps a foot long, with myriads of legs.

Yet another to a large, slow moving *Natica heros*, taking his morning walk, his huge foot and distended mantle causing doubt whether they can all be contained in the shell; another still discovers the beautiful little *Natica triseriata*.

Nearing the water, lines of sea-weed mixed with larger or smaller shells, mark the receding waves. After storms, immense heaps are thrown up, and collectors may obtain beautiful specimens of sea-mosses, the Irish moss (*Chondrus esculentus*) being quite abundant.

Large and fine specimens of the mussel (*Modiola modiolus*) are found attached to the roots of the Devil's apron, *Laminaria*, which is often seen twenty feet in length, with specimens of *Saxicava*, and now and then a *Chiton*.

On the beach are scattered, often thickly, the large shells of *Cyprina Islandica*, and *Mactea gigantea*, or hen clam, often used as milk skimmers, and occasionally perfect specimens of the beautiful little *Macchæra costata*. The common sun-fish or jelly-fish, *Aurelia aurita*, is very abundant, and the larger, darker-colored *Cyanea Postelsii* is not rare.

But it is in the little pools, upon and around the ledge of rocks at the northern end of the beach, that the lover of nature will be most richly repaid for careful search. Sometimes they are overhung by the arched rocks, forming deep and dark recesses, sometimes in the full light of the sun, revealing the minutest objects upon the bottom.

Delicate sea-weeds of various colors, with minute coralline growths, encrusting the rocks, cover the floor of these pools with a carpet of richest tapestry. Swimming about, may be seen various smaller fish, here finding a safe retreat from the voracity of their bigger relatives, while the crabs are sidling about in their awkward yet nimble way, and now and then a dark-green lobster glides about, skilfully eluding any attempt to capture him, while

the little sand-fleas leap in all directions, like so many grasshoppers.

The rocks are covered, in every direction, by an encrustation of barnacles, *Balanus ovularis* and *elongatus*, whose tentacles waving to and fro in the water, were supposed by the ancients to be the feathers of the young barnacle geese; and creeping about may be found in great abundance the common cockle, *Purpura lapillus*, in all varieties of color, white, yellow, slate, banded, and often prominently marked by its lines of growth. The writer has one specimen, pure white, heterostrophed, the only one he has ever seen among thousands.

The animal is carnivorous, and may often be seen boring his way through some other shell, making those round holes often seen in dead shells, and then at his leisure sucking out the unfortunate inhabitant, so that it seems poetical justice, when he in his turn has his shell summarily cracked, that he may be used as bait for the cunner or sea-perch, with which the coast abounds.

The three species of *Littorina*, *L. rudis*, *L. tenebrosa*, *L. palliata*, are seen travelling on all sides, and of all colors, white, black, red, yellow.

Tumbling over each other in eager haste, are various dead shells, each tenanted by a hermit crab, *Eupagurus*, having no covering for the posterior portion of his body, and so seeking protection in some empty shell, brandishing his claws at the entrance most fiercely, but often overcome and driven out by some stronger relative attracted by the superior accommodations of his tenement. Here also may be found a stranger lately arrived upon our shores, but which has been for several years working its way south, from Halifax, whither it seems to have been imported from Europe, *Littorina litorea*, the common periwinkle. The shell is black, and very thick, and the animal may yet become of commercial value, as in England, where everything edible is used for food, one London firm sells annually seventy thousand bushels of this mollusk.

Looking closely into the miniature caverns worn in the rocks by the action of the waves, we see great numbers of the star-fish or five-finger, *Asterias vulgaris*, of every variety of size and color, and may with interest study their slow locomotion as they put in action their myriads of suckers, on the under side of the body. The sea-egg, *Echinus granulatus*, is found in company, moving its long spines and sending out hundreds of thread-like suckers be-

tween them, by which it draws itself along. The sea-anemone, *Metridium marginatum*, occurs here, and with a little care in the search, may be seen expanding its yellowish, leathery disk into ocean flowers of great beauty and varied hues. Small sponges are not uncommon. The eggs of various fishes, as the square, black, leathery cases of the skate with their four long spines, are not uncommon, and to the careful observer, every hour reveals some new form of life, or discovers interesting and curious habits of forms already familiar.

In the ocean are found in abundance the cod, the haddock, the pollock, the hake, the mackerel, the cunner or sea-perch, the flounder, the dog-fish, the fisherman's special enemy, driving away all other fish, and even eating from the hooks fish already caught on the trawl, the sculpin, that marvel of ugliness, and more rarely the skate, the cusk, the blue-fish, and occasionally the huge, misshapen, abbreviated, sluggish, worthless, shorter sun-fish, *Orthagoriscus mola*, looking as if it might be one of Darwin's developments, that had not yet attained to a tail.

In the marshes back of the beach, all sorts of water-fowl abound, and the hunter's gun is often heard.

The flora of this locality also, is full of interest, especially to one unfamiliar with the curious forms of the spiny *Salsola Kali*, the thick, apparently leafless stems of *Salicornia herbacea*, and the cheerful colors of the beach pea, *Lathyrus maritimus*, flowering at intervals all through the season. All these and many others are found growing in the pure, white, dry sand, apparently incapable of furnishing either moisture or nourishment to any sort of vegetation.

To the lover of nature, accustomed only to the verdure and beauty of inland woods and fields, or the majesty of mountain scenery, a residence of a few days or weeks at Hampton Beach could hardly fail to bring much of novelty and constant interest, while the cool sea-breeze, and the glorious surf-bath, bring back vigor to the wearied frame, and the everlasting diapason of old Ocean, thundering against his rocky shores, can hardly fail to fill even the undevout mind with thoughts of the great and good Maker of all this beauty.